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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
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ART UNIT	PAPER NUMBER
3661	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/763,395	KWON ET AL.
	Examiner	**Art Unit**
	Christine M. Behncke	3661

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 October 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,6-10,12-16 and 18-20* is/are rejected.

7)☒ Claim(s) *5,11 and 17* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This office action is in response to the Remarks filed 16 October 2007, in which claims 1-20 were presented for examination.

Response to Arguments

Applicant's arguments filed 16 October 2007 have been fully considered but they are not persuasive. Applicant contends the 103 rejection applied is deficient because neither of the applied references teach a "slope-detecting means for sensing a slope of a floor" and, even if the references did, there is no motivation to combine the references. Specifically Applicant argues that the relied upon reference Adachi et al., merely teaches using traction between the wheel and the surface to control the robot between step and wheel modes (page 8 of Remarks). The Examiner respectfully disagrees to both contentions. Regarding the claim language, the claim **only** states a "slope-detection means for sensing a slope of a floor" (Claim 1)/ "a slope-detector" (Claim 13). The Adachi reference teaches a robot for traversing a mountainous environment that "includes steps, inclined terrain, and easily deformed and collapsed terrain." (paragraph 1 Introduction). As cited specifically, Adachi teaches the robot using an ultrasonic range sensor mounted on an active sensor arm to detect different terrain altitudes/steps that surround the robot (paragraph 3) which is detecting a slope of a floor.

It is noted that Applicant did not argue this specific teaching (the ultrasonic range finder as taught by Adachi is a slope-detector) of Adachi or the application of it. Instead Applicant argued that Adachi determines how to control the robot by traction. This

interpretation is not entirely correct; as Adachi explicitly states that traction is a merit, meaning a good value or quality. Traction is needed for the robot, but is not used in itself as a variable.

Regarding Applicant's contention that it would not have been obvious to combine the applied references, the Examiner disagrees. To one of ordinary skill in the robotic art, which is a high level of skill and creativity, Adachi's suggests the benefits of using a sensing means to determine the condition of the terrain surrounding the robot to automatically switch between locomotive modes in a robot for successful and efficient traversal of discontinuous ("mountainous environment" that inherently includes "steps, inclined terrain, and easily deformed and collapsed terrain") contact locomotion environment.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1-4, 6-10, 12-16 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jinichi, JP 2001-138272, in view of Adachi et al., "Mechanism and Control of a Leg-Wheel Hybrid Mobile Robot", Proceedings of the 1999 IEEE/RSJ, 1999 IEEE.

(Claims 1, 7, and 13) Jinichi discloses an ambulatory robot and method including a lower body having two or more legs and an upper body part installed on an upper end of the lower body part and capable of performing positional displacement by moving the lower body part (Figures 6 and 7), the ambulatory robot comprising: rotating means

installed on a bottom surface of each of the two or more legs (Figure 4); and control means for controlling a motion of the ambulatory robot using the lower and upper body parts ([0038]), wherein the control means controls a speed of revolution of the rotating means ([0040]), and controls the motion of the ambulatory robot so that the positional displacement of the ambulatory robot is performed by any of running, walking and sliding, depending on the controlled speed of revolution ([0073]-[0074]). Jinichi further discloses wherein the robot is able to walk up stairs, skid over floor surfaces, but does not disclose detecting the slope of a floor. However, Adachi et al. teaches control of a hybrid mobile robot that includes slope-detection means for sensing a slope of a floor (ultrasonic range sensor mounted on active sensor arm) and control the speed of the robot motion based on the detected slope of the floor (paragraph 4.2). Adachi et al. clearly is teaching the benefits of wheels, fast and efficient on flat terrain but cannot efficiently move on discontinuous terrain, and legs that move inherently slower (paragraph 1, lines 15-24) even on flat terrain but can negotiate obstacles and slopes.

(Claims 2, 8 and 14) Adachi further teaches decelerating means for slowing the speed of revolution of the rotating means, wherein the control means controls the decelerating means thereby controlling the speed of revolution of the rotating means (locking the front wheels, paragraph 3).

(Claims 3, 9 and 15) Adachi further teaches wherein the control means controls the decelerating means so that the speed of revolution slows to zero when the slope of the floor sensed by the slope-detection means is greater than a first preset angle (paragraph 4.2).

(Claims 4, 10 and 16) Adachi further teaches wherein the control means controls the motion of the robot so that the positional displacement of the robot is performed by walking when the speed of revolution equals zero (walking up steps, paragraph 4.2, and figure 7).

(Claims 6, 12 and 18) Adachi and Jinichi teach wherein the rotating means comprises two or more wheels (figure 1 for Adachi, drawing 14 for Jinichi).

It would have been obvious to one of ordinary skill in the robotic art at the time of the invention to combine the teachings of Adachi et al. with the robot of Jinichi because, as Adachi et al. suggests, detecting the slope of the floor surface and obstacles such as steps allows the robot to adapt physically to the environment, as Adachi's does by increasing traction by braking/locking the front wheels to increase stabilization over uneven ground (paragraphs 4.2 and 5) when the robot detects "discontinuous contact locomotion environment" by the ultrasonic range sensor (paragraph 3). The detection of discontinuous ground allows the robot to effectively negotiate flat terrain quickly, and lock the front wheel to create a stable leg when moving on a steep slope to slow the descent by generating more traction.

Claim Rejections - 35 USC § 103

Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jinichi in view of Adachi et al. as applied to claim 13 above, and further in view of Takenaka et al., US 2003/0114960.

Jinichi et al. in view of Adachi et al. teaches an ambulatory robot that senses the slope of a ground surface, however Adachi teaches the use of an ultrasonic range

sensor to determine the altitude of the surrounding terrain (paragraph 3) wherein the sensor is located in an arm, the purpose of this location is to further identify obstacles in the robot's path. A sensor is not located in the foot. However, Takenaka et al. teaches a walking mobile robot that estimates the inclination of the ground by the detected foot to floor reaction force detected by a Foot Floor Reaction Sensor 108 located in the foot of the ambulatory robot (figure 2). Takenaka teaches that it was well known in the prior art to use an inclinometer in the foot of the robot to determine the inclination of the floor surface ([0004]-[0007]). Takenaka does not specify which type of inclinometers were used in the foot of the robot, however it would have been obvious to one of ordinary skill in the art to use a liquid or bubble inclinometer in the foot as well as any other available inclinometer to determine the slope of the floor surface. Takenaka et al. further suggests it would have been obvious to position the inclinometer in the foot of the robot to determine the inclination of the surface at the point of landing to feedback and adjust for posture stabilization ([0007], [0009]).

Allowable Subject Matter

Claims 5, 11, and 17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christine M. Behncke whose telephone number is (571) 272-8103. The examiner can normally be reached on 8:30 am- 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas G. Black can be reached on (571) 272-6956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

CMB

THOMAS BLACK
SUPERVISORY PATENT EXAMINER